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ENVIRONMENTAL SOLUTIONS

Wet scrubbing systems an introduction



Clean air? It starts with scrubbing systems. These essential systems in the industrial sector remove pollutants and contaminants from gas streams, contributing to a healthier environment and compliance with strict environmental standards.

Whether in the chemical industry, waste management or energy production, wet scrubbers are indispensable for sustainable and safe operations that protect both human health and the environment.

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What is a wet scrubber system?

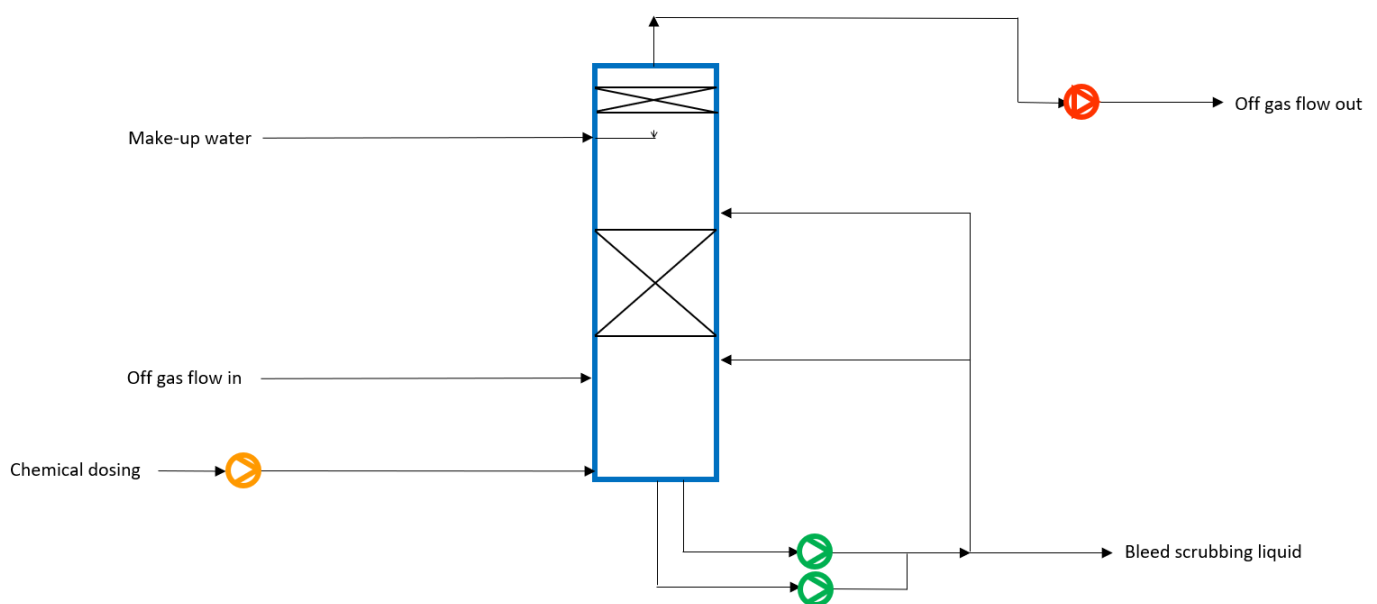
A wet scrubber is an air pollution control system in which a gas stream is brought into contact with a liquid (scrubbing liquid) for the purpose of transferring certain gaseous emissions (pollutants) such as hydrochloric acid (HCl), sulphur dioxide (SO₂) and ammonia (NH₃) to the liquid phase. Wet scrubbers can be used as an air pollution control system for many gaseous emissions.

A wet scrubber consists of the following main components:

- The column
- Scrubbing liquid recirculation pumps
- A fan
- Chemical dosing

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The flue gases enter the column, where the gases will be sprayed counter current with scrubbing liquid. The recirculation pumps recirculate the scrubbing liquid over the packed bed and the bleed. The chemical pumps provide the dosing of an acid or base to bind the off gases. The fan located before or after the scrubber leads the off gases through the system. See the image below for a schematic representation of a wet scrubber system.



Emission categories

Gaseous emissions can be divided into three categories; acidic, alkaline, and neutral emissions. Acidic emissions lower the pH of the scrubbing liquid and can be neutralized by adding a base, such as sodium hydroxide (NaOH). Alkaline emissions increase the pH of the scrubbing liquid and can be neutralized by adding an acid, such as sulphuric acid (H₂SO₄). The acidic and alkaline emissions are chemically bonded through an acid-base reaction, a process known as chemisorption. If the acidic and alkaline emissions are not bound, the emissions can be released again from the scrubbing liquid, but the acid-base reaction prevents this desorption. Neutral emissions, such as organic solvents cannot be bound by chemisorption.

Acids	Bases	Neutrals
Sulfur Dioxide (SO ₂)	Ammonia (NH ₃)	Toluene (C ₇ H ₈)
Hydrochloric acid (HCl)		Heptane (C ₇ H ₁₆)
Chlorine (Cl ₂)		

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Types of wet scrubber systems

There are two types of wet scrubber systems; a packed bed column and a spray column.

A packed bed column is a column which is filled with rings or structured packing material. These rings or packing material increase the contact area between the liquid and gas phases passing through the column, resulting in a more efficient absorption.

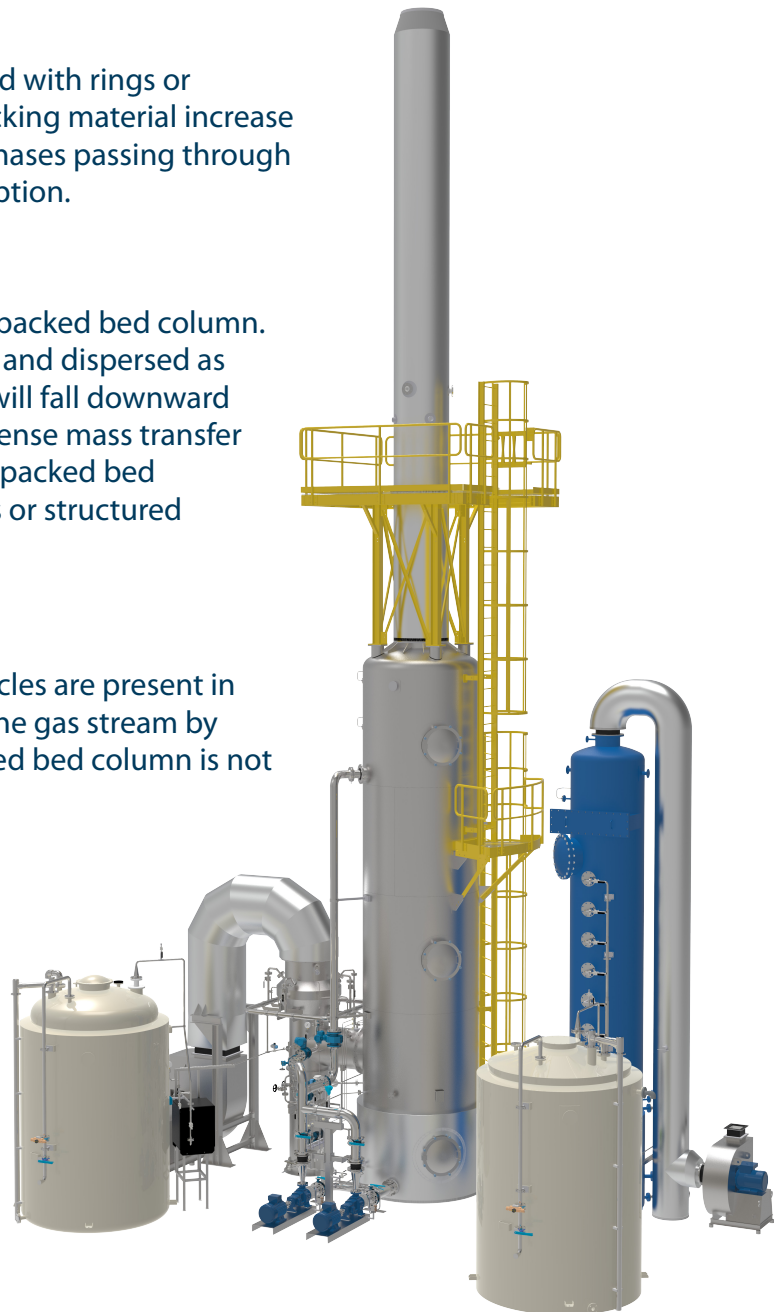
A spray column works slightly different than a packed bed column. In the column, a liquid is introduced at the top and dispersed as fine droplets by spray nozzles. These droplets will fall downward through an upward flow of gas, resulting in intense mass transfer between the liquid and gas phases. Unlike the packed bed column, a spray column does not contain rings or structured packing material.

A spray column is often used when sticky particles are present in the gas phases that cannot be removed from the gas stream by pre-treatment. In such cases, the use of a packed bed column is not appropriate, due to the possibility of clogging.

Thus, a packed bed column is used when no sticky particles are present in the gas stream, or when these sticky particles can be effectively removed from the gas stream by pre-treatment.

Would you like detailed information about these systems for your specific process?

[Contact our Air Pollution Control experts >](#)



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